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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/942,663	08/31/2001	Shigeo Kittaka	N36-135850M/TH	7814

30743 7590 11/17/2005

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EXAMINER	
STOCK JR, GORDON J	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 11/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/942,663	KITTAKA ET AL.	
	Examiner	Art Unit	
	Gordon J. Stock	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 August 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *14-27* is/are allowed.

6)☒ Claim(s) *1,3-13 and 28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 November 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment received August 28, 2005 has been entered into the record.

Drawings and Specification

2. The drawings and specification are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: **11 and 12** of Fig. 20. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance. Please refer to Response to Arguments concerning objections to Fig. 20.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1, 3, 4, and 6-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Burt et al. (6,052,213)—previously cited** in view **Todori et al. (6,002,522)—previously cited.**

As for **claims 1, 3, 4, 6-11,** Burt in an optical diffraction grating teaches the following: a periodic multilayer structure comprising layers of InP and an end surface not parallel but approximately perpendicular to the layer surfaces is a beam incident surface and an exit surface also is perpendicular as a beam exit surface (Fig. 7a; col. 5, lines 65-67; col. 6, lines 1-15); wherein, the structure is a one-dimensioned photonic crystal (col. 6, lines 17-35); with the period of the pillars comprising layers formed out of different materials (Figs. 7a and 7b); with the

pillars being able to vary continuously in size at different depths or varying in cross section such as being ellipsoidal (col. 6, lines 13-17); wherein the end surface and exit surface crosses perpendicularly said layer surfaces and are parallel to each other (Fig. 1; Fig. 7a; Fig. 9a); wherein the structure formed and repeated due to dependence on wavelength (col. 6, lines 20-27); the multilayer structure is an optical multilayer film of epitaxial layers (col. 5, lines 1-45); the structure is formed upon a transparent substrate and the beams are reflected in the transparent substrate and taken out of said substrate (Fig. 1: **2**; col. 4, lines 1-10); means for making a mixture of various luminous flux (Fig. 1: w; Fig. 9a: 93) and means for detecting rays of differing angles (Fig. 9a: 95 and output to terminal equipment). Burt is silent concerning the particular period to wavelength relation as stated in **claim 1**. However, Todori in an optical functional element comprising a photonic crystal teaches that the specific period to wavelength relation is necessary for proper signal transmission in optical communications; whereas, the period is equal to one half the wavelength and thereby is greater than or equal to one half the wavelength divided by any refractive index greater than or equal to 1.0 (col. 6, lines 35-50). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the photonic crystal device have a period greater than or equal to one half the wavelength divided by the refractive index in order to have proper optical signal transmission. In regards to the average refractive index in the period to wavelength relation, refractive index is an inherent property of optically transmissive materials; wherein, the value is 1.00 for vacuum and greater than one for any medium that is not vacuum. Therefore, in regards to Todori's period being half the wavelength with refractive indices being no less than 1.00 for optically transmissive materials, the period that equals one half the wavelength is greater than or equal to

the wavelength divided by two times the average refractive index with indices being from 1.00 or larger.

5. **Claims 1, 3, and 5-9** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Inoue et al. (5,033,810)—previously cited** in view **Todori et al. (6,002,522)—previously cited.**

As to **claims 1, 3, 6-9,** Inoue in an optical device discloses the following: a periodic multilayer structure, wherein two end surfaces are used for an entrance and exit surface; layers are formed out of different materials; end surfaces are perpendicularly crossed layer surfaces; exit surface crosses layer surfaces; exit and incident surfaces are parallel; and one structure is repeated with respect to a wavelength used (Fig. 1; Fig. 4b; col. 2, lines 45-67; col. 3, lines 1-5; col. 4, lines 3-40; col. 6, lines 1-40). Inoue does not explicitly state that the periodic multilayer structure is a one-dimensional photonic crystal, but he suggests it for the structure modulates input wavelength light by causing nonlinear effects such as second order harmonics (col. 2, lines 45-60) and the structure is uniaxial (col. 3, lines 25-35). Todori in an optical functional element comprising photonic crystal teaches that one dimensional photonic crystals are multilayered dielectric substances that produce second order harmonic effects with light passing through parallel to the layer surfaces with modulating effects due to photonic band gap (col. 5, lines 54-65; Fig. 9; col. 13, lines 15-25; col. 5, lines 20-35). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that Inoue's structure is one dimensional photonic crystal, for the uniaxial periodic multilayer structure modulates input wavelength light and produces second order harmonic effects indicative of having a photonic band structure. Inoue is silent concerning the particular period to wavelength relation as stated in

claim 1. However, Todori in an optical functional element comprising a photonic crystal teaches that the specific period to wavelength relation is necessary for proper signal transmission in optical communications; whereas, the period is equal to one half the wavelength and thereby is greater than or equal to one half the wavelength divided by any refractive index greater than or equal to 1.0 (col. 6, lines 35-50). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the photonic crystal device have a period greater than or equal to one half the wavelength divided by the refractive index in order to have proper signal transmission in optical communications. In regards to the average refractive index in the period to wavelength relation, refractive index is an inherent property of optically transmissive materials; wherein, the value is 1.00 for vacuum and greater than 1.00 for any medium that is not vacuum. Therefore, in regards to Todori's period being half the wavelength with refractive indices being no less than 1.00 for optically transmissive materials, the period that equals one half the wavelength is greater than or equal to the wavelength divided by two times the average refractive index with indices being from 1.00 or larger.

As for **claim 5**, Inoue in view of Todori discloses everything as above (see **claim 1**). Inoue is silent concerning a maximum refractive index is not smaller than .1 in a wavelength used. However, Todori discloses that at least a .1 refractive index difference is needed for modulating a wavelength of light (col. 10, lines 5-10). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the maximum refractive index be at least .1 in order to modulate the wavelength of light entering the optical device.

6. **Claim 1, 3, 5, 6, 9-13, 28** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Normandin et al. (5,111,466)—previously cited** in view **Todori et al. (6,002,522)—previously cited.**

As for **claims 1, 3, 6, 9-11, and 28,** Normandin in an optical multilayer structure for harmonic laser emission discloses: a multilayer structure with an end surface not parallel to layer surfaces of said multilayer structure used as a beam incidence or exit surface; layers are formed of different materials; end surface on which beam is incident crosses said layer surfaces substantially perpendicular; one structure on substrate is repeated with respect to wavelength used; means for making a mixture of various luminous flux having a plurality of wavelengths; and means for detecting beam rays exiting at different angles in accordance to frequencies; beam rays made to exit from said multiplayer film toward said substrate are reflected in the inside of said substrate and taken out from an end surface of said substrate (Figs. 1, 8, 9; col. 3, lines 1-15 and 55-67; col. 6, lines 55-65; col. 7, lines 15-30); whereas, refractive indices are continuously changing (col. 3, lines 15-30) and a refractive index difference between layers of different materials may be used (col. 4, line 35-50). Normandin does not explicitly state that the periodic multilayer structure is a one-dimensional photonic crystal, but he suggests it for the structure modulates input light with regions of differing indices of refraction (col. 3, lines 15-25) with nonlinear harmonic effects (col. 6, line 35-50). Todori in an optical functional element comprising photonic crystal teaches that one dimensional photonic crystals are multilayered dielectric substances that produce second order harmonic effects with light passing through parallel to the layer surfaces with modulating effects due to photonic band gap (col. 5, lines 54-65; Fig. 9; col. 13, lines 15-25; col. 5, lines 20-35). Therefore, it would be obvious to one of

ordinary skill in the art at the time the invention was made that Inoue's structure is one dimensional photonic crystal, for the periodic multilayer structure modulates input wavelength light and produces nonlinear harmonic effects indicative of having a photonic band structure. Normandin is silent concerning the particular period to wavelength relation as stated in **claim 1**. However, Todori in an optical functional element comprising a photonic crystal teaches that the specific period to wavelength relation is necessary for proper signal transmission in optical communications; whereas, the period is equal to one half the wavelength and thereby is greater than or equal to one half the wavelength divided by any refractive index greater than or equal to 1.0 (col. 6, lines 35-50). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the photonic crystal device have a period greater than or equal to one half the wavelength divided by the refractive index in order to have proper optical signal transmission. In regards to the average refractive index in the period to wavelength relation, refractive index is an inherent property of optically transmissive materials; wherein, the value is 1.00 for vacuum and greater than 1.00 for any medium that is not vacuum. Therefore, in regards to Todori's period being half the wavelength with refractive indices being no less than 1.00 for optically transmissive materials, the period that equals one half the wavelength is greater than or equal to the wavelength divided by two times the average refractive index with indices being from 1.00 or larger. Also Normandin demonstrates that the average refractive index is above 3.2 (Fig. 3).

As for **claim 5**, Normandin in view of Todori discloses everything as above (see **claim 1**). Normandin is silent concerning a maximum refractive index is not smaller than .1 in a wavelength used. However, Todori discloses that at least a .1 refractive index difference is

needed for modulating a wavelength of light (col. 10, lines 5-10). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the maximum refractive index be at least .1 in order to modulate the wavelength of light entering the optical device.

As for **claim 12**, Normandin in view of Todori disclose everything as above (see **claim 1**). In addition, Normandin discloses two incident surfaces perpendicular to said layer surfaces and one surface parallel to said layer surfaces as a beam exit surface (Fig. 1: 1, 3, 11).

As for **claim 13,** Normandin discloses everything as above (see **claim 12**). Again, Normandin is silent concerning the particular period to wavelength relation. However, Todori in an optical functional element comprising a photonic crystal teaches that the specific period to wavelength relation is necessary for proper signal transmission in optical communications; whereas, the period is equal to one half the wavelength and thereby is greater than or equal to one half the wavelength divided by any refractive index greater than or equal to 1.0 (col. 6, lines 35-50). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the photonic crystal device have a period greater than or equal to one half the wavelength divided by the refractive index in order to have proper signal transmission in optical communications. In regards to the average refractive index in the period to wavelength relation, refractive index is an inherent property of optically transmissive materials; wherein, the value is 1.00 for vacuum and greater than 1.00 for any medium that is not vacuum. Therefore, in regards to Todori's period being half the wavelength with refractive indices being no less than 1.00 for optically transmissive materials, the period that equals one half the wavelength is greater than or equal to the wavelength divided by two times the average refractive index with indices being

from 1.00 or larger. Also Normandin demonstrates that the average refractive index is above 3.2 (Fig. 3).

Allowable Subject Matter

7. **Claims 14-27** are allowed.

As to **claim 14**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an optical device the particular condition being satisfied, in combination with the rest of the limitations of **claims 14, 18-27.**

As to **claim 15**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an optical device the beam incidence surface is a surface parallel to said layer surfaces of said multilayer structure and wherein the beam exit surface is approximately perpendicular to said layer surfaces in combination with the rest of the limitations of **claims 15-16.**

As to **claim 17**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an optical device the particular condition being satisfied, in combination with the rest of the limitations of **claim 17.**

Response to Arguments

8. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection. However, in regards to the Remarks of August 28, 2005 (page 10) that state that Todori does not teach the particular period to wavelength expression, Examiner disagrees for Todori teaches the period should be one half of the wavelength. As explained above, refractive index is an inherent property of optically transmissive materials; wherein, the value is 1.00 for vacuum and greater than 1.00 for any medium that is not vacuum.

Therefore, in regards to Todori's period being half the wavelength with refractive indices being no less than 1.00 for optically transmissive materials, the period that equals one half the wavelength is greater than or equal to the wavelength divided by two times the average refractive index with indices being from 1.00 or larger. Also Normandin demonstrates that the average refractive index is above 3.2 (Fig. 3). In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., not having a non-linear optical coefficient and functioning to separate the light based on frequency, as mentioned at the top of page 10 of Remarks) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

As for applicant's arguments concerning the previous objections to the specification and drawings, Examiner agrees with proposed correction to Fig. 20, the addition of 11 and 12. And withdraws the objection to the drawings/specification that Fig. 20 does not have '4.'

As for the previous double patenting rejection, upon further consideration, Examiner has withdrawn the double patenting rejection, for the claims of this application do not appear to be obvious variants of the claims of Kittaka et al. US 2003/0174402 (10/367,814)—cited by applicant.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: **(571) 273-8300**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gs
November 10, 2005

Gregory J. Toatley, Jr.
Supervisory Patent Examiner
Art Unit 2877